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Staff retention and job satisfaction at a hospital clinic - a case study

Paul Holmström, BA

Master Student at the IT-University of Göteborg
Management Consultant, fluidminds
Fallströmsgatan 8
SE 431 41 Mölndal, Sweden
+46 31 706 3200
paul@holmstrom.se

Marie Elf, MSc

PhD student at Chalmers University of Technology, Department of Architecture in Gothenburg and Institution of Public Health and Caring Sciences. Uppsala University
Nissers väg 3
SE 791 82 Falun, Sweden
+46 23 22 311
marie.elf@ltdalarna.se

In this study system dynamics has been used to explore staff retention and job satisfaction at a maternity department, which was in an unfavourable spiral of attrition after an expansion period. This raised the issue about how to stop this downward spiral. To understand and explore this a causal loop diagram and a system dynamics model were developed, integrating factors of attrition and hiring rates, workload and qualitative contents of the work. The causal loop diagram shows an unbalanced system, which may spiral favourably or unfavourably after a relatively small disturbance. The system dynamics model shows that an unfavourable spiral may be reversed by qualitative interventions. The conclusions are that system dynamics is an interesting method, which may increase the understanding of the factors determining staff retention, job satisfaction and work pressure in a hospital setting. There is need for further examination of the qualitative factors incorporated in the model.

INTRODUCTION

There is a shortage of professionals in health care in Sweden as well as in other Western World countries. This problem will probably be accentuated in the future (Swedish National Board of Health and Welfare 2000; County Council Association 2002; Werkö 2003). The shortage may be due to change pressure forced by a financing cutback (which probably will continue). Health care managers and providers are therefore forced to find more efficient and effective ways of producing health care while at the same time improving the quality of patient care. During the last 10 years the health care sector has gone through a period of turmoil with organisational changes, including altered political and economical conditions. There has been a positive development with improvements in effectiveness, but also alarming reports of high stress levels leading to exhausted staff, increasing short-term sick leave and reduced job satisfaction. This has in turn resulted in an increase in staff turnover. A consequence is a spiral of increasing wages in order to attract staff. Thus, it is important for the health care sector to influence this situation in order to achieve continuous quality and effectiveness.

There is sparse evidence of organisational and management factors that have an impact on health care practice and health outcomes (West 2001). West (West 2001) claims there are reports on performance measurement but less on performance management and little on the determinants of performance. However, some organisational factors have been identified as important for health care outcomes, for example continuing training and education, leadership style, project management, staff recognition, dedicated time and resources for improvement projects (Shortell et al. 2000; Thomson et al. 2003). It also has been documented that staff shortages influences the quality of care (Aiken 2001; Aiken, 2002; Needleman, 2002), as there seems to be a correlation between on, one hand, the number of staff and, on the other hand, patient mortality and severe complications.

A staff cutback may lead to decreased competence in the organisation, which could result in additional difficulty in recruiting qualified professionals. Aiken and co-workers (Aiken 1998; 2001; Buchan 1999) have in several studies explored factors that influence the attraction of a workplace. Crucial factors are high staffing levels and a high nurse-to-patient ratio. Wages, a flexible working schedule, and job prospects are central factors for job satisfaction. Thus, support to individuals to develop their potential, and to increase their autonomy seems to be important factors as well as for experiencing quality of work (Aiken 2002; Buchan 1999;

West 2001). Other important factors for job satisfaction are interdisciplinary relationships, possibilities of improving work quality and a decentralized organisation (Thomson et al. 2003). Adams and co-workers (Adams 1998) suggested that quality improvement has benefits on professional satisfaction, and that this may influence productivity and staff motivation to perform well.

Thus, workforce management aims at sustaining a high quality in health care. In this study, we will consider how factors which management can control, such as training and quality development, may increase productivity and improve the quality of care.

Problem context and description

The present project began with an organisational review of a ward at a hospital clinic that had recently undergone a substantial expansion (the number of birthing capacity was increased from 1500 to 2200 per year). The ward manager was overworked and splitting the unit was considered.

During the study it was discovered that the staff increase had led to a lack of perceived staff continuity and a reduction in job satisfaction. There had also been an increase in the short-term sick leave. As the hospital is in a geographic location where there is a chronic shortage of midwives and a high staff turnover in general, the reduced job satisfaction could possibly lead this clinic into an unfavourable spiral of perpetual dissatisfaction and staff turnover.

The hospital management was concerned with the increase in short-term sick leave, as this leads to higher costs. The organisation realized the problem at hand, but searched for solutions, which might not resolve the problem.

Actions by the authors

A first survey was carried out in the autumn and winter of 2002. The issues identified turned out to be complex. The conclusions of the report have been generalized and presented in the causal loop diagram (Figure 1). The diagram indicated several reinforcing loops that cause an unfavourable downward spiralling development, resulting in work pressure and job dissatisfaction and staff attrition.

The case study presented here uses System Dynamics to scrutinize the structure and behaviour of work pressure and job satisfaction. In previous studies empirical approaches have

been used to study workload and job satisfaction in health care organisations. However, there are few published studies that have taken a comprehensive approach to this problem (West 2001). Thus, there is sparse scientific evidence of the impact that managerial factors as presented in this study have on outcomes such as job satisfaction.

Aim

The main purpose of the study was to identify variables that influence staff turnover and job satisfaction. A second purpose was to explore positive interventions and to estimate how strong they need to be in order to turn a negative trend.

Research questions

- Which is the main causal feedback structure of the system underlying the staff turnover and job satisfaction influencing effectiveness and productivity in the hospital ward under investigation?
- Which are the leverage points by way of which a policy may impact this system favourably?
- Which are some of the policies that may be developed for the purpose of improving the behaviour of the system by way of the leverage points identified?

Hypotheses

- The unfavourable behaviour can be triggered and reinforced by relatively small disturbances.
- The unfavourable spiral can be reversed by factors such as quality development, training and co-operation between professionals.

METHOD

System Dynamics was used as the preferred method of analysis since the method explicitly presents the relationship between the variables in a non-linear, dynamic feedback system (Sterman 2000).

Procedure

A semi-structured interview instrument was developed, with open-ended questions such as the content of the daily work, decision-making, patient flows and the opinion about the organisation at the unit. 25 professionals and managers were interviewed. The answers were

analyzed using a social analytical approach (Rowbottom 1977) as well as an epistemological/cybernetic approach (Krogh 1995; Watzlawick 1984). The purpose was to understand the entire social context as well as the behaviour of the individual and the social structure within the context. The intention was to uncover the underlying system that caused the problem.

A causal feedback loop diagram was developed initially, to show the structure of the system. The first tentative causal loops were built on the reported findings of the organisational study. The interview notes were reviewed to confirm and develop causal diagrams portraying the underlying causal structure of the organisation. The final causal diagram is shown in Figure 1. The diagram was later on transformed into a stock and flow diagram.

The personnel department gave historical data, such as number of staff, recruitment and turnover, sick leave for the past three years. These data were used as input and to validate the effects of the model. Published empirical data were also used to determine effects of professional knowledge, education, cooperation and quality development.

A literature review was conducted at an early stage of the modelling process. Empirical studies concerning job satisfaction, quality of care and workload or work pressure in health care were searched for in the literature review.

The model was created incrementally by modelling and validating the baseline of each subsection. Finally the sections were brought together into an overall model for experimentation.

FEEDBACK STRUCTURES

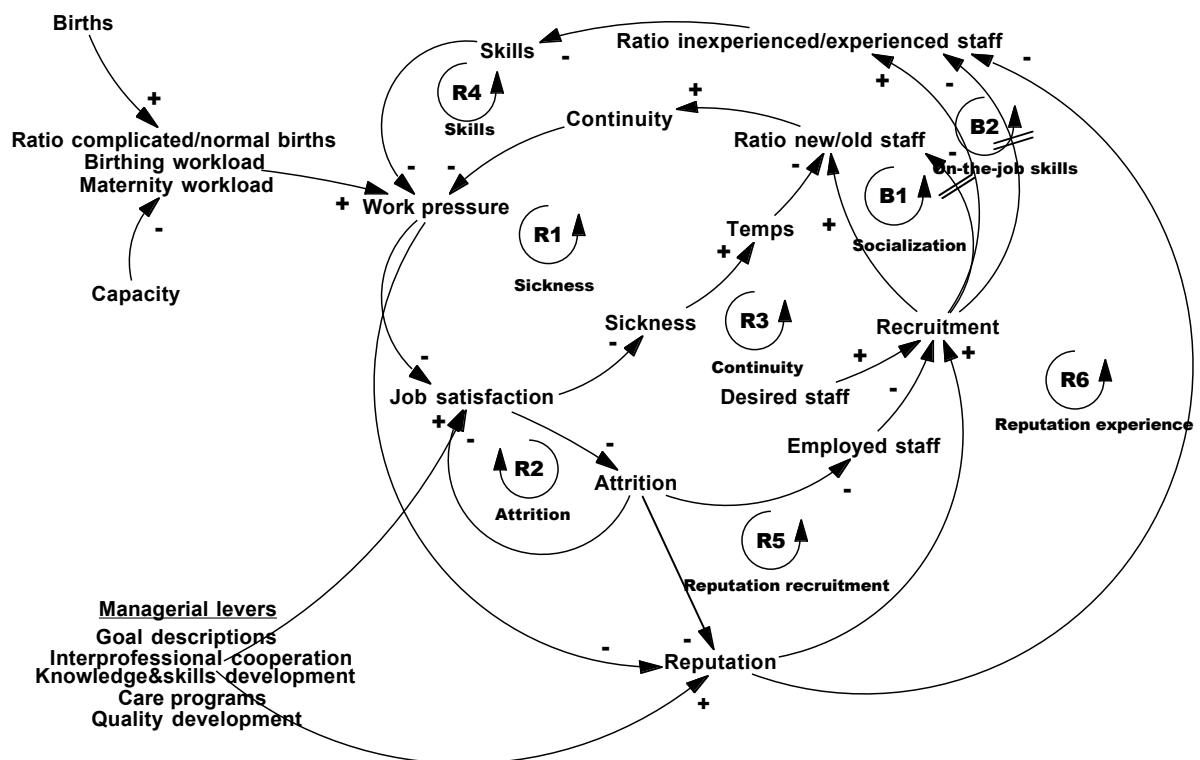


Figure 1. Feedback structures of staff retention and job satisfaction

The feedback structure is basically a set of self-reinforcing loops making it sensitive to outside influences. There are only two balancing loops and they have delays, indicating that any change in the external input will create a spiralling dissatisfaction or satisfaction, only to be tempered by time and by alternative changes in the input. For instance, if the work pressure increases it will lead to a decrease in job satisfaction. A decline in job satisfaction will cause an increase in staff attrition and the reinforcing structure pulls into action. The feedback structures developed in the model are shown in Figure 1. We have chosen not to describe the causal diagram or the specific loops in detail; our purpose is to point out the dominance of the reinforcing loops.

There are two clusters, which influences the system and determine the direction of the reinforcing structure. One cluster of factors lies outside the power of the management, such as the number of births and the political and financial decisions, which determine the capacity of the wards. The other cluster, which management can influence, consists of inter-professional cooperation, quality development as well as knowledge and skills development. When attrition increases, there is a risk that the managers seek quick solutions, such as attracting new

staff with higher pay instead of addressing work pressure and dissatisfaction with the job situation. The diagram highlights the main factors that interact to affect job satisfaction and work pressure. This pattern may cause the managers of the organisation to:

- Prevent staff turnover by increasing job satisfaction and decreasing work pressure.
- Increase the good will of the organisation (staff reputation) since that will affect the possibility to recruit needed individuals.
- Improve the possibility for individual development and quality improvement.

MODEL STRUCTURE - STOCKS AND FLOWS

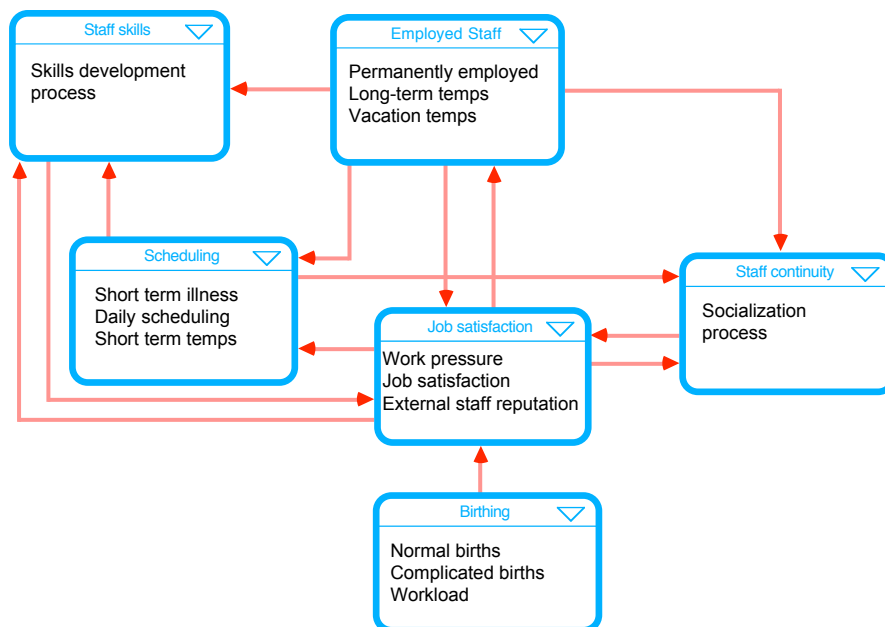


Figure 2. Overview of the model structure with key variables

In the model we have used some particular definitions, which we describe below:

One issue, identified in the interviews, was described as **staff continuity**. In an organization staffed around the clock, the year around, staff does usually not work in fixed teams. The more staff are rotated among shifts the more they perceived a lack of continuity. This is also exacerbated when new staff is employed and during the vacation period. As the normal shift rotation is held constant during the studied time period, we have chosen only to model the introduction of new and temporary staff, defining what we have called a **socialization process**, described in more detail on page 10.

As will be seen further on, noise is part of the model. This has been included deliberately to reflect the conclusions of the interviews. There is considerable variation in birthing, leading to peaks, which lead to memories of workload. Also there is a significant flux in taking in temporary staff, also leading to significant memories of disruption in perceived staff continuity. Our experience is that a model just showing averages and excluding noise will not readily be seen, by hospital staff, as reflecting their reality.

Employed staff

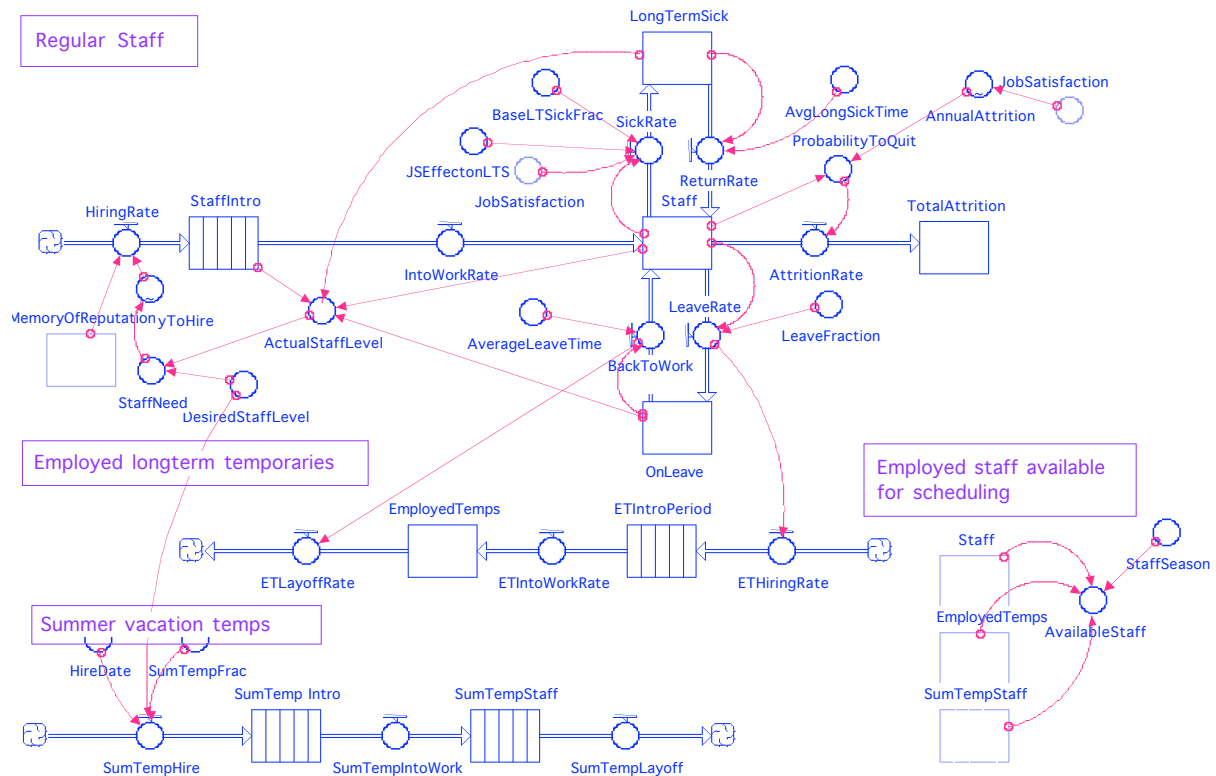


Figure 3. Regular staff, long-term and summer vacation temporaries

The employed staff sector (Figure 3) shows that there are several factors determining the number of employed staff in the organisation. For instance, the rate of long-term sick individuals, the attrition rate and the hiring rate. The staff can leave the organisation entirely or temporarily, being long-term sick or on leave for studies or parenthood.

Individuals are hired when there is an actual deficit in actual staff level. The actually employed staff is the total of permanently employed staff, including those who are long-term sick or on long term leave for education or parenthood. The introduction time for newly employed is one month during which they work alongside experienced staff in order to become familiar with the staff and routines at the department. The staff available for scheduling con-

sists of the permanently employed staff (excluding those being long term absent), the long-term temporaries and the summer temporaries. Job satisfaction influences the probability that individuals leave the organisation for reasons such as other jobs or sickness.

The situation is changed during the summer, when one third of the ordinary staff is on vacation, in three periods of three weeks. This period ranges from mid June to mid August. The desired summer staff level determines the number of summer temporaries hired. The introduction time for the summer temporaries is also four weeks. The summer period is perceived as disruptive with staff discontinuity, reduced experience and increased work pressure.

The staff on long term leave (education or parenthood) is replaced with long-term temporaries. But staff on long-term sick leave is not replaced in this way, as they can return at short notice.

Birthing

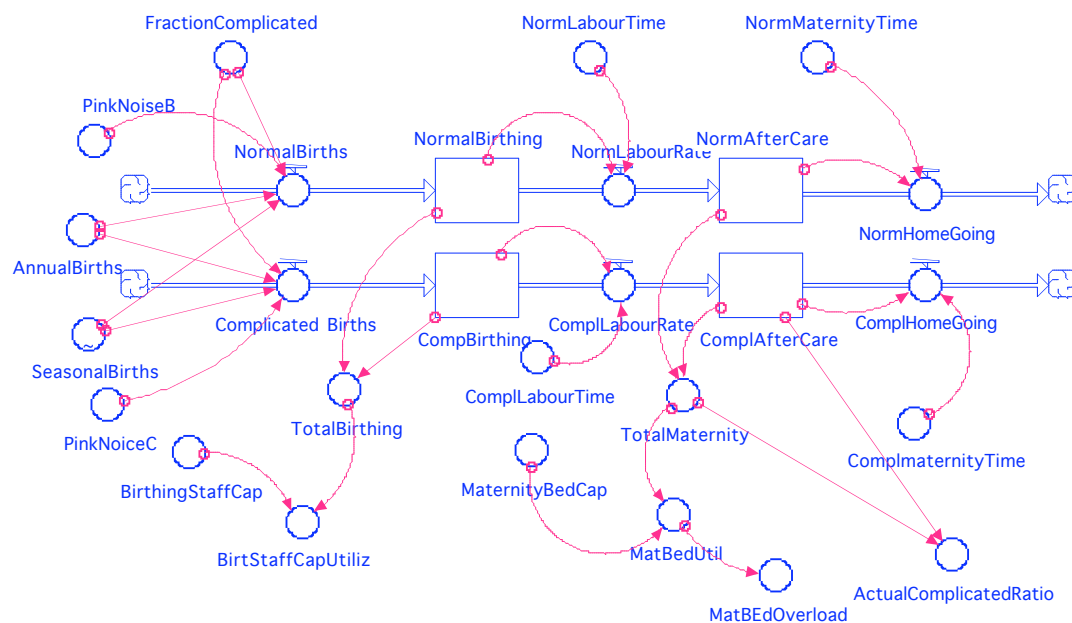


Figure 4. Structure of the comprehensive birthing process

The childbirth model includes two parallel and isomorphic processes, normal and complicated birthing. A normal situation is a birth without any complications neither for the mother or the baby (Figure 4). The model has a pink noise function to reflect the considerable variations in day-to-day birthing, The normal birthing process as well as the aftercare is shorter than for the complicated birthing. The fraction of complicated births is 20%, but varies con-

siderably, affecting work pressure. The model also takes into consideration the annual seasonal variation in birthing.

The capacity constraint in birthing is the number of available midwives being able to handle two parallel birthings each. The capacity has been set to be able to handle the peaks, which leads to a low average utilization. However, in the maternity wards, the number of beds is the constraining factor. Patients spend longer time in Maternity than in Birthing, so the variation in influx is dampened, enabling a higher utilization.

The staff talks about the complicated rate being 20%, but due to the longer time in birthing as well as maternity, these represent 30% of capacity utilization.

Staff continuity

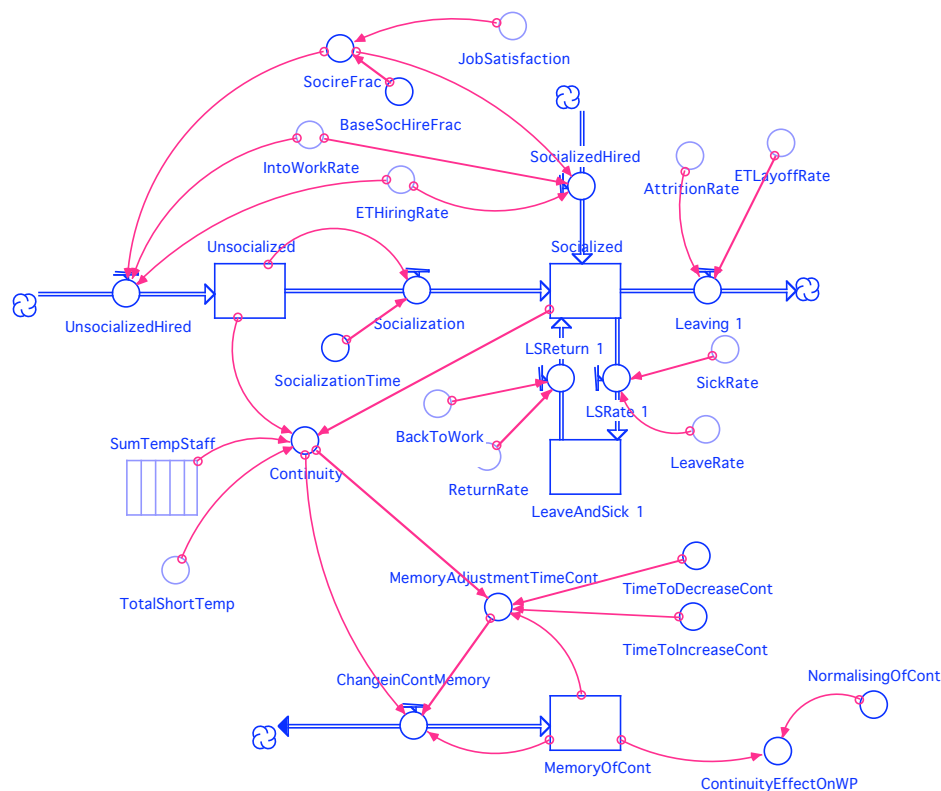


Figure 5. Socialisation process of newly hired staff and perceived continuity

Most new employees are unknown and not yet socialized into the organisation (Figure 5). The socialization process takes an average of one year, as shift work and rotating schedules means that it takes time to get to know everybody and learn and adapt to how they work. Doctors, midwives and auxiliary nurses all use judgment in their work and it takes time to mutually adjust in the work with newcomers. However, a fraction of the new employees are

former temporaries and are considered as already being socialized. That fraction is influenced by job satisfaction. A higher job satisfaction leads to more temporary workers seeking permanent employment.

The unit of measure is “units of socialization”. A newly employed person enters the stock of “unsocialized” staff and gradually “seeps” into being socialized, as she/he becomes partially known in the organisation.

Memories from periods of declined continuity last for a time even if the situation is changed to the better. Thus, there is an information delay in the state of memory of continuity among the staff. In particular, the impact of the summer temporaries lingers for almost half a year.

Skills coflow

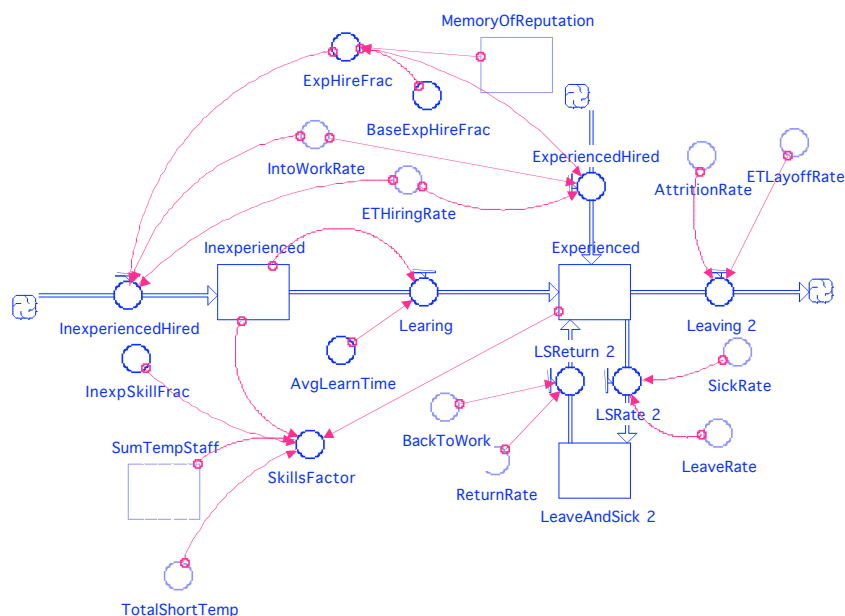


Figure 6. From novice to expert

Figure 6 illustrates the learning process (coflow). The department recruits both individuals that are newly examined and individuals that are experienced (skilled). New staff directly from nursing school cannot contribute as much as the skilled employees. An inexperienced midwife has 60% of the skills of an experienced midwife, here defined as 0.6 units of knowledge. It takes on average one year to become fully skilled. During that period the new staff is scheduled in the same way as other staff, leading to an increase in work pressure, as they need support.

Memories of the perceived skills among the staff persist over time, generating inertia to the perceived change of the actual state. The staff has bad experience of periods of several novice individuals within the organisation, which creates discontinuity. Bad experience and memories about this periods remains for a while even if the actual situation has been improved.

Scheduling

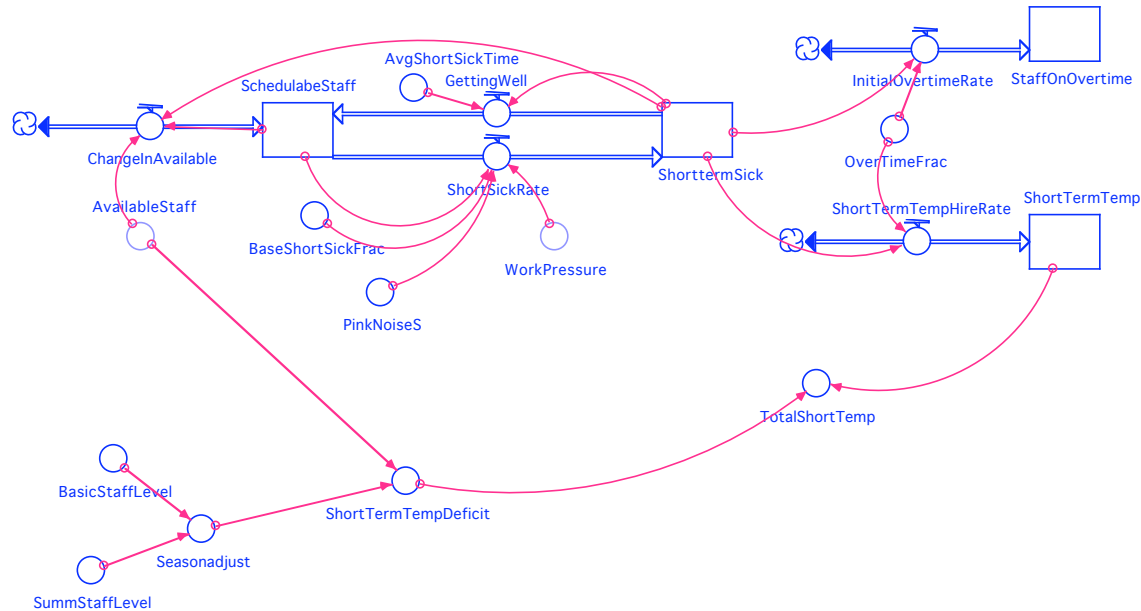


Figure 7. Structure of short - term sickness, overtime and temporaries

This section handles daily scheduling and the need to hire short-term temporaries due to understaffing and short-term illness. When employees report in sick at short notice, somebody on the preceding shift working overtime usually replaces them, apart from that temps are used. A pink noise function has been added to reflect the fluctuations in illness. Work pressure can also influence the sick. A higher degree of work pressure will results in an increased rate of short-term sickness.

If the proportion of short-term temporaries is high it will reduce the perceived continuity and increase the work pressure for the remaining staff.

Work pressure and job satisfaction

This model sector illustrates job satisfaction, work pressure and external staff reputation and the factors influencing those variables.

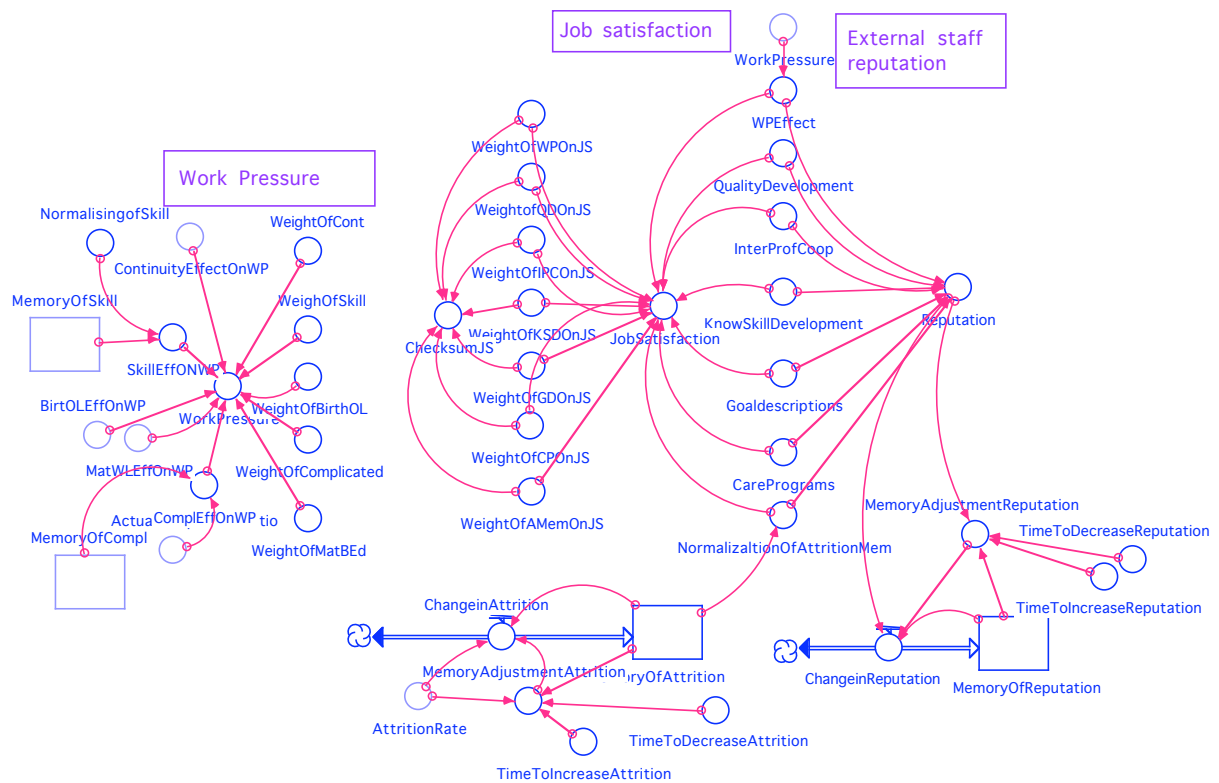


Figure 8. Work pressure, job satisfaction and external staff reputation

There are several factors that determine the work pressure, such as the number of birthings, ratio of complicated birthing, as well as the ratios of socialized and skilled midwives. All determinants of work pressure have informational delays built in.

Job satisfaction is also determined by work pressure, quality development, knowledge development and interprofessional co-operation. The existence of care programs and goal description will influence the job satisfaction. These variables were chosen based on the interviews as well as research. Factors, such as the possibility for the professionals to work with quality development and investments on the professional's knowledge development, increase the job satisfaction (Adams et al. 1998; Aiken et al. 2002). Interprofessional cooperation and a clear apparent goal of the work may enhance the job satisfaction (Aiken et al. 2002; Thomson et al. 2003; Shortell et al. 2000).

The external staff reputation is essential for the recruitment of new employees. Due to the competitiveness in attracting staff it is important to have a good reputation. We suggest that the external staff reputation is mainly dependent on those factors which can be observed from the outside, such as attrition, quality development and interprofessional cooperation, but also work pressure, goal descriptions and care programs (Figure 8).

VALIDATION OF THE MODEL

In the validation process the equations and behaviour of each sector were reviewed. These were compared with data available from interviews and data collection. Consistency was obtained by specifying the units of measurements for each variable and checking for unit consistency. The quantitative data such as the number of staff, long-term sickness and number of temporaries that were built into the model were received from the hospital administration. When using parameters that needed a judgmental estimation, the base was empirical studies presented in the literature. Further on, the preceding interviews and our own modelling experiences were used as a base for judgmental estimations of parameters such as the learning time for a midwife to be an experienced midwife and the value of cooperation between professionals.

The model was developed as a system under ideal conditions. Initially the submodels were stabilized with real figures and estimated variable numbers that should correspond to an ideal but realistic situation. When this step was performed the model was tested and simulated with extreme input values. This was performed to test the robustness of the model under varied conditions. The submodels were then put together to the whole and subjected to varied data, within the expected ranges.

The baseline simulation is based on the present situation with a birthing capacity of 2200 per year and the corresponding staff levels.

Validation baseline runs

Figures 9-13 show validation baseline runs to compare and analyze with later simulations. The intention with the baseline run was to set up the model so that it reproduces the behaviour of the present system.

The time period in the simulations is months. The simulations run over time of three years. The employed staff and the newly born are simulated as discrete individuals as the populations are so small that the effects of using discrete units are significant. However, the short-term sickness and short-temporaries are non-discrete since they can be off or be hired part time of a day.

Figure 9 illustrates the variation in employed staff throughout the year and how this influences the number of newly employed staff introduced into the organisation. The model reproduces the pattern of the historical data obtained from the department and shows the stability and variation expected in a baseline model.

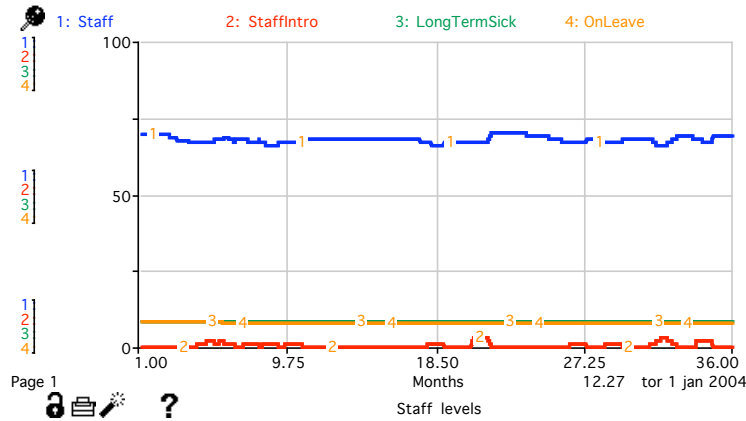


Figure 9 Staff stocks

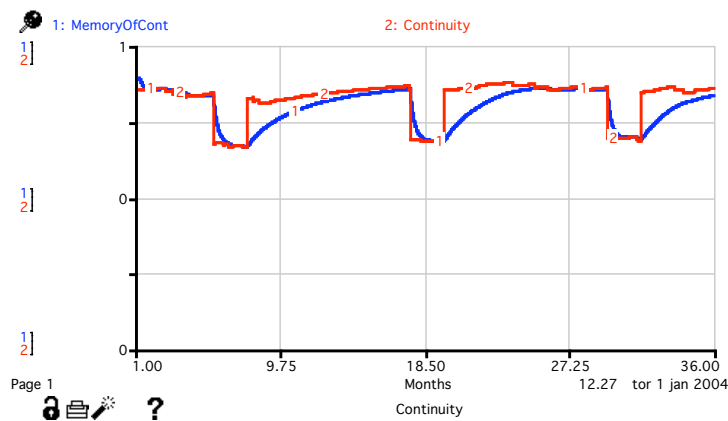


Figure 10. Perceived staff continuity

Figure 10 shows the validation run for the perceived continuity and the memory of the continuity. The continuity declines during the summer periods when there are numerous summer temporaries. A new employed individual has to go through a “socialization” process to get to know the regular staff and the routines at the department. There is a corresponding dip in the skills level.

The model behaves as expected. Individuals are aware of the periods when there is a high amount of new employees or a high fraction of temporaries since the skills level is reduced. These periods recur each summer. The memory of those periods remains for a long time. In the validation run we set the retention memory time to be 2 months, which shows behaviour

in line with the interviews. Several of the staff expressed that they remember periods with discontinuity for a long time. Figure 11 shows the same pattern but with the memory of the staffs skills.

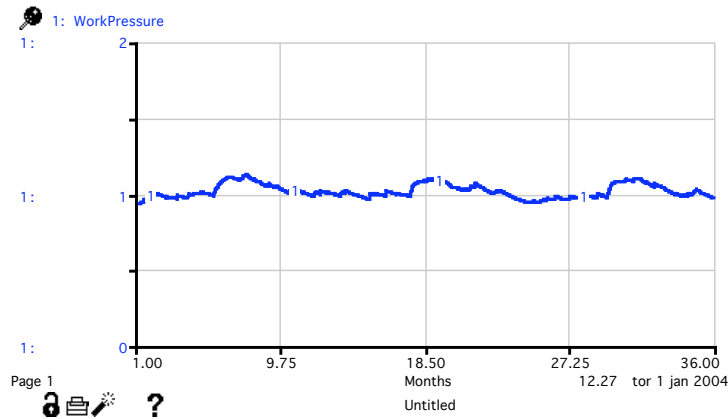


Figure 11. Variation of the work pressure

The work pressure is determined by workload in birthing and maternity, ratio of complicated births, continuity and skills. The baseline run shows that there is a significant variation of the work pressure related to birth overload but also to the periods of discontinuity (Figure 11). The component factors of work pressure were weighted so as to correspond to the effect according to the interviews.

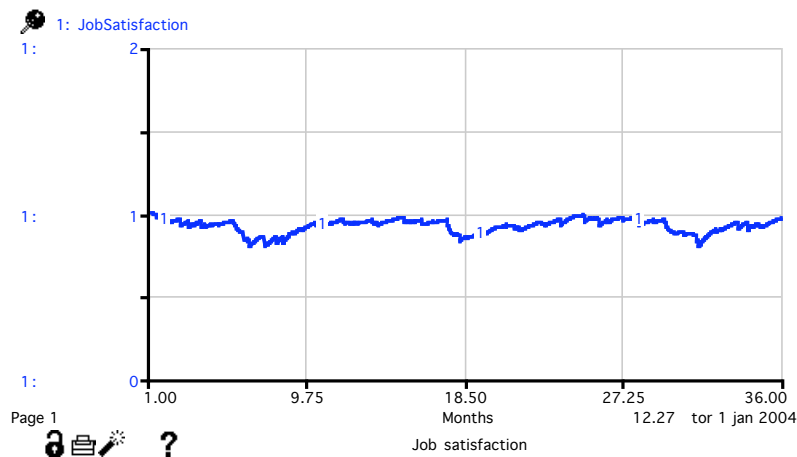


Figure 12. Job satisfaction

The validation run for job satisfaction was performed in the same way as the validation for the work pressure. The factors that are assumed to influence the job satisfaction were weighted based on the interviews as well as literature. The diagram (Figure 12) shows that there is a significant variation in job satisfaction related to different periods of continuity and

number of births. Job satisfaction is based on two dynamic factors and five static parameters. The two dynamic factors are work pressure and attrition, the latter having a “demoralizing” effect. The five static parameters are quality development, interprofessional cooperation, knowledge and skill development, goal descriptions and care programs. These qualitative parameters were mentioned by many in the interviews and are also described in the literature to be important for job satisfaction. The baseline values were estimations of how the hospital rates as compared to other hospitals.

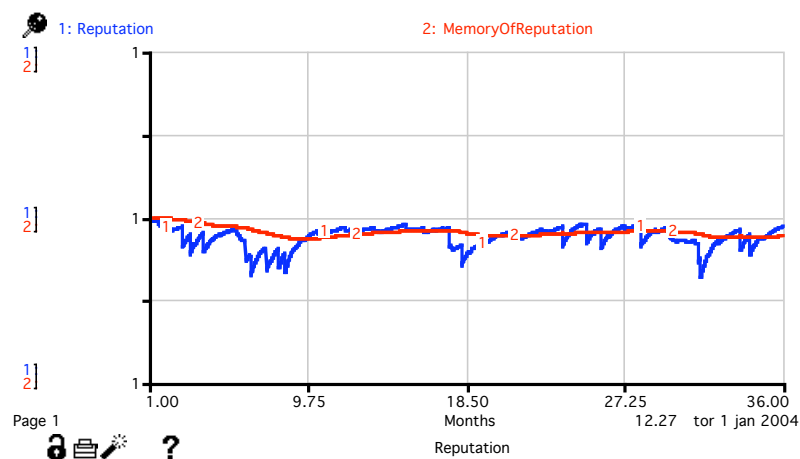


Figure 13. The external staff reputation

Figure 13 illustrates the validation run for the external staff reputation. The external reputation is based on the same factors as for job satisfaction, however with different weighting. Attrition has been given a high weight as information of conditions at a workplace spreads with people who have left. Also the qualitative factors have been given higher weight reflecting that opinions about the hospital are spread by participation in e.g. conferences. The informational delay times have also been set significantly longer for the external reputation.

RESULTS OF THE SIMULATIONS

One of the hypotheses in present study was that qualitative efforts might have a stabilizing effect and thereby reducing attrition and increasing job satisfaction. Three sets of simulations were run accordingly. The first series were variations of the baseline run in order to test strategies for reducing attrition.

The intention of second series was to simulate the effects of political decision to increase the birthing capacity from 1500 to the present level of 2200. This was actually done about two

years ago, in order to increase the birthing capacity in the region. The clinic has a natural intake from its local area, after the expansion they also took in patients redirected from more distant hospitals.

The third set of simulations were to address the fact that staff which were long-term sick, were replaced by short-term temps as well as the steady state error incurred by the delay between attrition and recruitment.

The following questions were a base for the experimentations:

- What will happen to the attrition rate when the state of the system is changed?
- What will happen to the attrition rate when the qualitative factors of the work are changed?
- What is the effect on continuity and skill when the birthing capacity is increased?

Baseline variations

The baseline series are based on the present birthing capacity of 2200 per year and the corresponding staff and bed capacity. The purpose was to test strategies to reduce attrition. The work pressure and job satisfaction receives a jolt each summer when temporaries are hired during the summer vacation (Figure 14). This is most clearly seen in the graph showing perceived staff continuity (Figure 15).

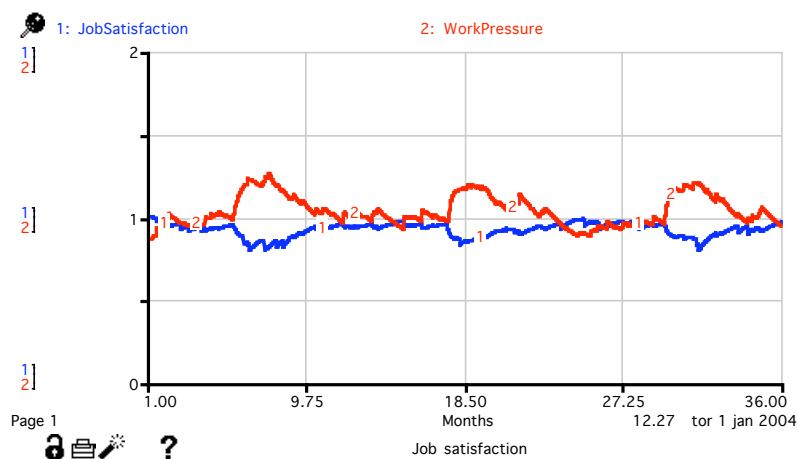


Figure 14. Relationship between work pressure and job satisfaction

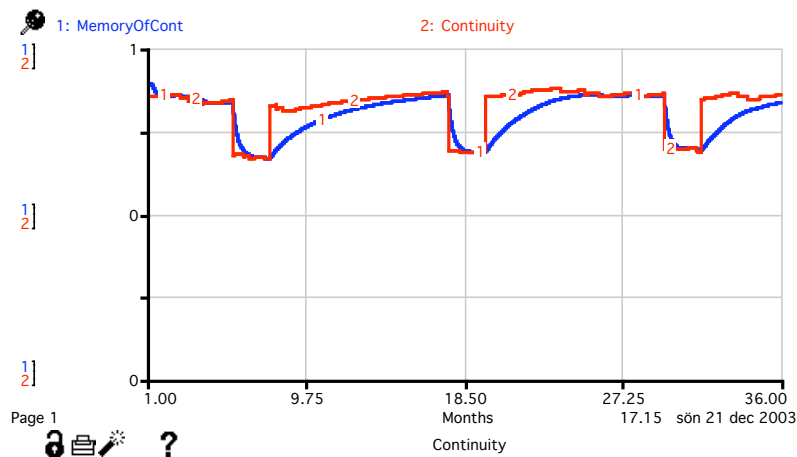


Figure 15. Perceived continuity

The total attrition during the simulation of three years is 18 persons (Table 2). To get an indication of the vacation related effect, a simulation was performed with the assumption that all vacations were spread out over the whole year. The condition was a correspondingly higher staff level, with no temporaries. This reduced the total attrition to 15 individuals per year. Thus, the effect of the discontinuity of the summer temporaries leads to an increased attrition of one person per year. In other words, spreading the vacation could be one strategy to reduce attrition. However, not being able to get a summer holiday for the ordinary staff may decrease job satisfaction. This assumption is not modelled since empirical data is lacking to support that statement.

The department allocates six education days per employee and year. According to the interviews this is considered as generous and is perceived as higher than what many other hospitals offer. However, the content of the education is also considered as one-way communication (more as lectures) and lacking in focus. In other qualitative improvements efforts the department is considered as being under par, when compared to other hospitals.

Apart from the baseline run two simulations were performed. In the qualitative run at a medium level, each of the parameters was set to 1. In the “high qualitative run”, a redistribution of efforts from knowledge and skills development to more on-the-job related development such as quality improvements work and interprofessional cooperation. Also, an increase in management related tasks such as goal descriptions and care programs were performed. An assumption was done that the redistribution could be done without increasing the total costs (Table 1).

Table 1. Qualitative input variables at different levels

Input parameters	Base conditions	Medium level efforts	High level efforts
Quality development	0,85	1,00	1,20
Interprofessional cooperation	0,80	1,00	1,20
Knowledge and skill development	1,25	1,00	1,15
Goal descriptions	0,85	1,00	1,25
Care Programs	0,90	1,00	1,25

Table 2. Attrition rate by year and totally

Year	Base conditions	Medium level efforts	High level efforts
1	8	7	3
2	3	2	2
3	7	6	6
Total	18	15	11

In the simulation at the medium level the total attrition is the same as for the spread vacation simulation. This indicates that it might be fairly easy and not costly to reduce the attrition caused by periods of high hiring of temporaries. Also, it indicates that by redistributing existing development costs it would be possible to reduce attrition even further.

A simulation was run where we replaced the long-term sick with long term temps, and another where we took into consideration the steady state error in the staff stock due to the delay between attrition and recruitment. Both simulations had the expected outcomes on the staff levels, but showed no change in the staff attrition.

Capacity increase (Quantum jump) variations

The baseline simulation was revised to include a “quantum jump” in birthing capacity, from 1500 to 2200 per year, along with corresponding increases in staffing and maternity beds and birthing rooms. This was planned in advanced and executed in an organized way so that all the required resources were in place. Staff was recruited and in place at the time of increase. The model was altered so as to allow an extra inflow of staff and a ramping up of all other necessary parameters. The increase in capacity takes place in the first month of the second year of the simulation.

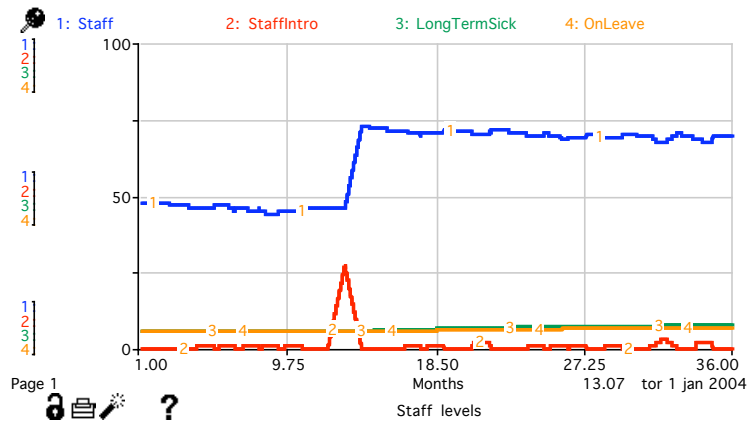


Figure 16. “Quantum jump” of new employees due to capacity increasing

As expected, this has a significant effect on the perceived continuity (Figure 17). Continuity has not quite recovered after the following summer vacation and drops even further as there is a sudden influx of new staff. Then comes the next summer vacation before continuity has recovered. This is confirmed by the interviews carried out in the autumn of year two, the organisation feels that it is in disarray and that it is full of newly employed.

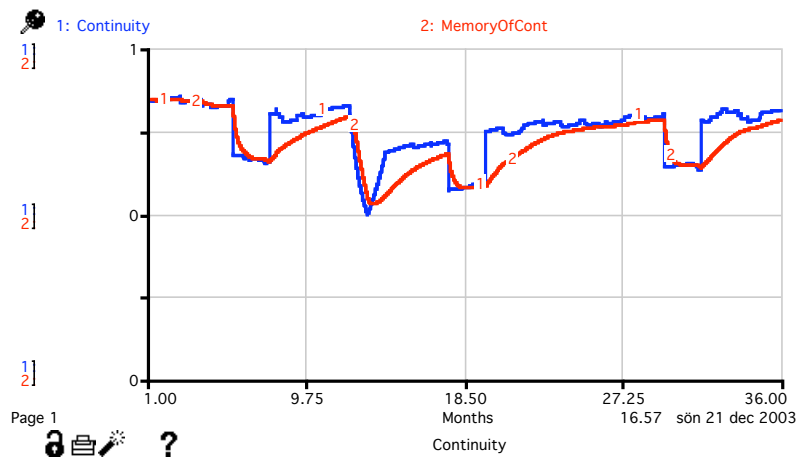


Figure 17. Continuity after capacity increasing

Naturally, this has an effect on work pressure and job satisfaction, which both deviate significantly at the moment of the capacity increase (Figure 18).

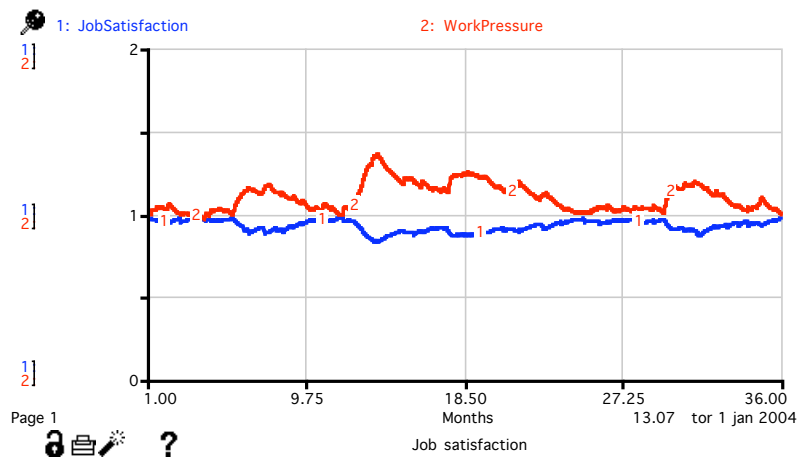


Figure 18. Work pressure and job satisfaction related to capacity increasing

In reality this lead to significant attrition (Table 2). Staff experienced a connection between the reduction of continuity and a reduction of taking collective responsibility for the whole work setting. Further on, the staff stated that when continuity declines, the work pressure increases and as a consequence employees quit. Thus, it is important to ask what strategies management could have pursued to counteract the situation and not resort to wage escalation when recruiting the replacements.

Searching for other possible solutions, three further simulations were performed. A revised base run (taking into consideration the lower staff level of year 1), and the same assumptions for qualitative factors as for the baseline variations i.e. a medium and a high effort level (Table 1).

Table 3. Attrition by year and totally

Year	Base	Quantum Jump	Medium level efforts	High level efforts
1	6	6	4	2
2	3	7	7	2
3	7	7	7	6
Total	16	20	18	10

The table 3 shows the attrition rate at the “quantum jump”. The increase in capacity leads to a significant increase in attrition in the second year. Four additional individuals leave the organisation compared to the baseline simulation. In the baseline simulation the medium qualitative efforts were enough to compensate the vacation effect shown in table 2. In present simulation the medium investment in qualitative factors is not sufficient to fully counter the

effect of the sudden increase of capacity. The simulations show that the high qualitative efforts have the same high effect on attrition as in the baseline simulations and well compensate the undesired effects of the capacity increase.

DISCUSSION AND CONCLUSIONS

A point of departure was how to attain a qualitative and a good health care setting in a situation of change and turmoil. The main purpose was to investigate variables that influence the job satisfaction and staff turnover. A second purpose was to explore the positive interventions and estimate how strong they need to be in order to turn a negative situation.

To sum up, the simulation results confirm one of the hypotheses, that the system is relatively easily disturbed, by such a commonplace circumstance as the summer vacation, and that it is possible to compensate that effect by efforts such as quality improvement work and other factors under the control of the management. The pattern of the summer vacation period is an important indication of what happens in a situation when the combined effect of many new employees, the impact of the managerial factors on the clinical outcomes such as quality, effectiveness and productivity are not fully explored. These latter factors were not measured and could therefore not model explicitly. However, the results showed that continuity affects work pressure and job satisfaction. Thus, it could be assumed that the perceived continuity is a key dimension of effectiveness and productivity.

The development of a model is important since the shortage of hospital workers is a crucial problem in health care today. Health care is exposed to extensive change pressure. Organisational changes, alterations of political and economical condition, but also a knowledge explosion with new treatment alternatives have created a situation of perpetual change. The financial cutbacks have forced all involved to find more efficient and effective ways of working and yet still emphasizing improvements in the quality of patient care (SOSFS 2001).

There are distressing reports of high stress that health care workers are exposed to which cause job dissatisfaction, burnout and staff turnover. At the same time, several reports indicate that job satisfaction is essential for the motivation to perform a good job (Aiken et al. 1998; Sullivan et al. 1999). The demands on the professional will not end. Thus, action based on managerial efforts presented in this study such as knowledge development and quality improvements are particularly urgent if the expectations of an effective and high quality

health care are to be realized. If a workplace should be considered as attractive and creates job satisfaction, the individual should be able to perform high-quality work. This is a motivation factor in itself for individual (Herzberg 1968) Thus, it is important that work conditions do not hinder the individual to do good work.

The capacity of the midwives was modelled and defined as the amount of births the professionals were capable of handling during normal circumstances. This definition is close to the meaning of productivity. The concept does not declare anything about the quality of the births they manage to handle. Traditionally, health care quality has been assessed in terms of efficiency i.e. the productivity of health care. In other words, “the number of patients treated in the shortest time”. This output indicates whether the chosen treatment is the right one in productivity or technical terms. This outcome does not identify, for instance, the patient’s feelings, comfort, and quality of life during or after treatment. Thus, effectiveness is concerned with the degree to which treatment is beneficial to the patient (Campbell 2000).

In the interviews, the staff expressed that in periods with a high proportion of newly employed the work setting was dissatisfactory. The staff skills declined and the work was less organised. This situation may have implications for the health and safety of mothers and babies. The capacity, i.e. the number of births, may be the same but the quality of the care is probably influenced negatively. Results from other studies show that serious events are based on shortage in knowledge of the health care staff. Inexperienced staff is not fully capable to discover a patient’s health problems and need in time. Thus, risks for serious complication enhance (Aiken et al. 2002; Aiken et al. 2002; Lundstrom et al. 2002; Needleman et al. 2002).

Birthing is a highly technical setting and the margins between failure and success are small. In the delivery process the physical health status is of great importance. However, the midwife has to be able to meet each mother’s individual health and need of care. It is a complex task, including both pain relief, anxiety and to support the initial bonding process between the mother and infants (McKenna et al. 2002; Liu et al. 2002). It is important for avoiding posttraumatic crises both for the woman and child and avoiding later utilization of health care.

The employees that are satisfied with their job are likely to remain at their work, leading to lower staff turnover. Probably, experience has a feedback on performance from several per-

spectives. Experienced individuals are probably more inclined to influence decisions at the work place. This is needed for the development of praxis and for care improvement. Participation and share of decisions in work gives more satisfaction among the employees. Thus, staff skills are of great importance to attain a high quality of care but also for the ability to improve the praxis. Furthermore, health care is based on teamwork. In extreme and acute conditions it is essential that each one in the team knows exactly what to do and what their colleagues are doing, in order to achieve good results. Good teamwork is evaluated between individuals that have been working together for a while. The teamwork can be challenged when new individuals enter the organisation. In the present study it is suggested that this is an important factor of job satisfaction.

To conclude, as shown in the study, there are factors beyond merely external conditions such as number of births that are of relevance regarding how to retain staff in the organisation. Those factors may be quality improvement, knowledge development and interprofessional teamwork.

Method discussion

There are some limitations of the model and the modelling process. There is a lack of empirical data in the model, especially for variables such as work pressure, job satisfaction and quality factors. When we went into the modelling phase the hospital was suddenly under threat of closure. Management was busy handling the political situation and we were unable to obtain additional data. Thus, the model is not comprehensive and involved some vague variables. However, the primary aim with the model was not to present exact quantitative figures and solutions of the personnel situation at the department. Rather the aim was to demonstrate that it is desirable and possible to involve some hypothesis from the scientifically literature of what creates job satisfaction in health care organisations. The aim was to study if the qualitative factors presented in the literature generate the dynamics that was expected in the literature.

Ideally, the model process should have involved a team from the hospital for validation of the model. The reliability and usefulness of the model would have been more valid if a group of experienced individuals had been involved in the process. However, the circumstances at the hospital during the modelling process made it impossible to continue with the project. On the other hand, both the modellers have long experience from health care and can thus be viewed as expert in the field. Reviewed health care scientific literature was used as a base for the

modelling. Thus, the developed model is not very specific, but can be generalized to other health care settings with similar problems.

The staff, long-term temporaries and births were modelled as discrete entities. In these cases it is appropriate to handle people as discrete, whole individuals. The organisation hires whole individuals and women deliver whole babies. One strong argument against this procedure may be that people in this kind of organisations work part time and thus the staff should be handle as continuously variables. Short-term sickness and temporaries was modelled as con-tinual variables since one individual can be away from the work part of a day.

The challenge with the model was to capture the structure and behaviour of the factors that determines job satisfaction, work pressure and the external staff reputation. The clear effects of the simulation may be mainly due to two factors, i.e. the weightings used to define job satisfaction and the non-linear relation between job satisfaction and attrition. The relationships were modelled as linear, which is acceptable within the ranges of the model. However, it would be desirable to continue to develop the model together with professionals from the hospital to identify and describe the non-linear relationships. This would be necessary to test major departures in policy.

It may have been important to include a wage variable for several reasons. The wages are essential for the external staff reputation and thus for the recruiting process. Wages can be a competitive instrument between hospitals. Further on, professionals in health care have individual wages related to achievement. Thus, it may be important to relate wages to the perceived job satisfaction since the wage is a receipt and a confirmation for a good performance. On the other hand wage escalation may be seen as an archetypal “quick fix” and the purpose with present study was to find alternative strategies.

Implication for research

Increasing the job satisfaction of hospital workers is one of the most important challenges for the health care in the future. The present model has shown that factors such as quality improvement and cooperation between professionals may be important for job satisfaction and staff retention. As these have such a significant impact it would be interesting to research these further and gather more data so as to refine the model in this respect. Thus, there is a need for further empirical work to explore the importance of those relationships. In the future it is also important to further analyse the effect of job satisfaction on quality outcomes such

as patients well-being and health. The question should be: how could we develop the structure and organisation for the possibility to improving the care for the patient.

Implication for practice

It is important for the managers to have a tool that gives possibilities to explore and control actions in the organisation. Modelling gives the potential to explicitly clarify the work of management, but also to discuss policy questions within the organisation. In the present study, we show that it may have been possible for the management to avert the attrition caused by the capacity increase. This did not happen in reality; probably because of the management was occupied planning the extension in localities and recruiting the new staff. Being busy with this they were not able to foresee the human resources effects. This is most likely to be a common problem in other similar situation.

Possible extensions of the model

Mintzberg (1983) describes several archetypal organizational forms, one of them being the professional bureaucracy, with hospitals and universities as the prime examples. Universities and most other organizations staffed by professionals solve the vacation problem by cutting capacity and/or spreading the vacations. During the vacation period hospitals cut capacity in many clinics and wards, and those units open must be staffed by professional holding requisite qualifications.

The professional bureaucracy differs from most other structures as disturbances and dysfunctionalities in the organization can be compensated by professional freedom and development (Mintzberg 1983). There are three major sources of “disturbances” presented in this study, the vacation period, the sudden high increase in capacity and the strong noiselike variations in the workload. This study also suggests that these disturbances can be offset by professional development.

We suggest that extensions of the model mainly be sought in professional bureaucracies, which do not cut capacity during the vacation period, and replace those on vacation by professionally qualified temporaries. I.e. conditions mainly present in hospitals.

REFERENCES

- Adams, A., S. Bond, and C. A. Hale. 1998. Nursing organisational practice and its relationship with other features of ward organisation and job satisfaction. *Journal of Advanced Nursing* 27 (6):1212-22.
- Aiken, L. H., S. P. Clarke, and D. M. Sloane. 2002. Hospital staffing, organisation, and quality of care: cross-national findings. *Nursing Outlook* 50 (5):187-94.
- Aiken, L. H., S. P. Clarke, D. M. Sloane, J. Sochalski, and J. H. Silber. 2002. Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction. *JAMA* 288 (16):1987-93.
- Aiken, L. H., D. M. Sloane, and J. Sochalski. 1998. Hospital organisation and outcomes. *Quality in Health Care* 7 (4):222-6.
- Campbell, S.M., Roland, M.O., Buetow, S.A. 2000. Defining quality of care. *Social Science & Medicine* 51:16611-1625.
- County Council Association, the. *Svensk hälso-och sjukvård under 1990 -talet. Utvecklingstendenser 1992-2000. (The Swedish health care system during the 1990s.* Landstingsförbundet 2002.
- Herzberg, Frederick. 1968. *Work and the nature of man.* London: Staples Press.
- Krogh, Georg von. 1995. *Organisational epistemology.* Basinstock: MacMillan.
- Liu, S., M. Heaman, M. S. Kramer, K. Demissie, S. W. Wen, and S. Marcoux. 2002. Length of hospital stay, obstetric conditions at childbirth, and maternal readmission: a population-based cohort study. *American Journal of Obstetrics & Gynecology* 187 (3):681-7.
- Lundstrom, T., G. Pugliese, J. C. Bartley, J. Cox, and C. Guither. 2002. Organisational and environmental factors that affect worker health and safety and patient outcomes. *AJIC: American Journal of Infection Control* 30 (2):93-106.
- McKenna, H., and F. Hasson. 2002. A study of skill mix issues in midwifery: a multimethod approach. *Journal of Advanced Nursing* 37 (1):52-61.
- Mintzberg, Henry. 1983. *Structure in fives : designing effective organizations.* Englewood Cliffs, N.J.: Prentice-Hall.
- Needleman, J., P. Buerhaus, S. Mattke, M. Stewart, and K. Zelevinsky. 2002. Nurse-staffing levels and the quality of care in hospitals. [see comments.]. *New England Journal of Medicine* 346 (22):1715-22.
- Rowbottom, Ralph. 1977. *Social analysis: a collaborative method of gaining usable scientific knowledge of social institutions.* London: Heineman.
- Shortell, S. M., R. H. Jones, A. W. Rademaker, R. R. Gillies, D. S. Dranove, E. F. X. Hughes, P. P. Budetti, K. S. E. Reynolds, and C. Huang. 2000. Assessing the impact of total quality management and organisational culture on multiple outcomes of care for coronary artery bypass graft surgery patients. *Medical Care* 38 (2):207-17.
- SOSFS. 2001. SOSFS, 1996:24 Socialstyrelsens föreskrifter och allmänna råd. Kvalitetssystem i hälso-och sjukvården (Advisory instructions on quality systems in health care). Socialstyrelsens författningssamling 2001. In *Socialstyrelsen författningshandbok (The Swedish National Board of Health and Welfare).* Stockholm: Liber AB.
- Sullivan Havens D, Aiken LH. 1999. Shaping systems to promote desired outcomes. *Journal of Nursing Administration* 29 (2):14-20.
- Swedish National Board of Health and Welfare. 2000. *Omfattning av administration i vården (The amount of administrative tasks in health care).* Socialstyrelsen www.sos.se 2000 [cited 2000].

- Thomson O'Brien, M. A., N. Freemantle, A. D. Oxman, F. Wolf, D. A. Davis, and J. Herrin. 2003. Continuing education meetings and workshops: effects on professional practice and health care outcomes.
- Watzlawick, Paul. 1984. *The invented reality. How We Know What We Believe What We Know*. New York: Norton Company.
- Werkö, L. 2003. Från läkarens hjälpreda till jämställd vårdpartner in Swedish (From assistant to equal care provider). *Läkartidningen* 100 (19).
- West, E. 2001. Management matters: Audit and feedback: effects on professional practice and health care outcomes. The link between hospital organisation and quality of patient care. *Quality in Health Care* 10 (1):40-8.